

Benedikt Bitterli



<https://benedikt-bitterli.me>



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WORK EXPERIENCE

SEPT 2021 - Current	Senior Research Scientist at NVIDIA Research, Redmond Graphics research on new algorithms and representations of geometry and appearance.
JUNE 2020 - SEPT 2020	Research Intern at NVIDIA Research, Redmond Continued development of the <i>ReSTIR</i> algorithm for improved robustness and performance.
JUNE 2019 - AUG 2019	Research Intern at NVIDIA Research, Redmond Development of the <i>ReSTIR</i> direct lighting algorithm for real-time raytracing of large numbers of area lights.
FEB 2016 - AUG 2016	Civil Service at University of Basel, Basel Development of virtual reality applications for computer tomography imaging on the HTC Vive. Performance optimizations on image registration software.
SEPT 2015 - DEC 2015	Research Intern at Disney Research Zurich, Zürich Research, development and implementation of denoising algorithms for participating media.
MAR 2014 - AUG 2015	Part-time Research Intern at Disney Research Zurich, Zürich Research, development and implementation of new appearance models for Hair and Fur, in tight collaboration with Walt Disney Animation Studios.
SEPT 2013 - FEB 2014	Technology Intern at Walt Disney Animation Studios, Burbank Heavy performance and memory optimization on the Hyperion production renderer, involving high-level algorithm design and low-level optimization for SIMD and memory hierarchy in C++11. Research and development of new importance sampling techniques. Development of in-house content creation software for specialized lighting.

EDUCATION

SEPT 2016 - AUG 2021	PhD in COMPUTER SCIENCE Dartmouth College, NH, USA Dissertation: "Correlations and reuse for fast and accurate physically based light transport"
FEB 2014 - SEPT 2015	Master of Science in COMPUTER SCIENCE Swiss Federal Institute of Technology (ETH), Zürich Graduation with Distinction Thesis: "Informed Choices in Primary Sample Space"
SEPT 2010 - SEPT 2013	Bachelor of Science in COMPUTER SCIENCE Swiss Federal Institute of Technology (ETH), Zürich Thesis: "A rendering framework for the BSSRDF"

PUBLICATIONS

2020	<i>Spatiotemporal reservoir resampling for real-time ray tracing with dynamic direct lighting</i> , SIGGRAPH 2020 Benedikt Bitterli , Chris Wyman, Matt Pharr, Peter Shirley, Aaron Lefohn, Wojciech Jarosz
2019	<i>Selectively Metropolised Monte Carlo light transport simulation</i> , SIGGRAPH Asia 2019 Benedikt Bitterli , Wojciech Jarosz
2019	<i>Photon surfaces for robust, unbiased volumetric density estimation in computer graphics</i> , SIGGRAPH 2019 Xi Deng, Shaojie Jiao, Benedikt Bitterli , Wojciech Jarosz
2018	<i>A radiative transfer framework for non-exponential media</i> , SIGGRAPH Asia 2018 Benedikt Bitterli , Srinath Ravichandran, Thomas Müller, Jan Novák, Steve Marschner, Wojciech Jarosz
2017	<i>Reversible Jump Metropolis Light Transport using Inverse Mappings</i> , ACM Transactions on Graphics Benedikt Bitterli , Wenzel Jakob, Jan Novák, Wojciech Jarosz
2017	<i>An Efficient Denoising Algorithm for Global Illumination</i> , High Performance Graphics 2017 Michael Mara, Morgan McGuire, Benedikt Bitterli , Wojciech Jarosz
2017	<i>Beyond Points and Beams: Higher-Dimensional Photon Samples for Volumetric Light Transport</i> , SIGGRAPH 2017 Benedikt Bitterli , Wojciech Jarosz
2016	<i>Bilateral Regularization in Reproducing Kernel Hilbert Spaces for Discontinuity Preserving Image Registration</i> Christoph Jud, Nadia Möri, Benedikt Bitterli , Philippe C. Cattin
2016	<i>Nonlinearly Weighted First-order Regression for Denoising Monte Carlo Renderings</i> , EGSR 2016 Benedikt Bitterli , Fabrice Rousselle, Bochang Moon, José A. Iglesias-Guitián, David Adler, Kenny Mitchell, Wojciech Jarosz, Jan Novák
2016	<i>A Practical and Controllable Hair and Fur Model for Production Path Tracing</i> , Eurographics 2016 Matt Jen-Yuan Chiang, Benedikt Bitterli , Chuck Tappan, Brent Burley
2015	<i>Portal-Masked Environment Map Sampling</i> , EGSR 2015 Benedikt Bitterli , Jan Novák, Wojciech Jarosz

SCHOLARSHIPS AND AWARDS

SEPT 2020	NVIDIA Graduate Fellowship	(\$50,000)
DEC 2014	Physically Based Simulation Competition, ETH	1st place
JUN 2014	ETH Rendering Competition	1st place
JUN 2014	Game Programming Lab, ETH	Jury Award
AUG 2013	Demodays 2013	2nd place
MAR 2013	Master Scholarship Award	(\$20,000)
MAR 2013	Revision 2013	2nd place
AUG 2012	Demodays 2012	1st place
MAY 2010	Swiss Olympiad in Informatics	7th place

NOTABLE PERSONAL PROJECTS

Tungsten Renderer	Physically based offline renderer for research. Used in 10+ publications. https://github.com/tunabrain/tungsten
Rendering Resources	Open source data set of resources for physically based rendering research. Used in 25+ publications. https://benedikt-bitterli.me/resources/
Tantalum	GPU-based, 2D spectral path tracer. Runs in the browser. Featured on Chrome Experiments. https://benedikt-bitterli.me/tantalum/
GPU Fluid	High quality GPU-based fluid simulator. https://benedikt-bitterli.me/gpu-fluid.html
Star Stacker	Automatic tracking, alignment and merging of astrophotography images. https://benedikt-bitterli.me/astro/
Buddhabrot	Animation, rendering and denoising of a large-scale Buddhabrot fractal. https://benedikt-bitterli.me/buddhabrot/

NEWS COVERAGE

JULY 2020	Technology.org, <i>Advanced Ray Tracing Techniques Improve Computer Graphics</i>
MAY 2020	NVIDIA Developer News, <i>Rendering Millions of Dynamic Lights in Real-Time</i>
NOV 2018	arstechnica, <i>New software will let artists control how light interacts with objects</i>
NOV 2018	SciTech Europa, <i>The physics of movie-making: making computer animation more realistic</i>
NOV 2018	EurekAlert, <i>Moviemaking mimics nature for creative control and a more realistic look</i>
JUN 2018	Hackaday, <i>Stars looking a bit dim? Throw some math at them</i>
NOV 2015	boingboing, <i>Tantalum, a beautiful, browser based ray-tracer</i>
NOV 2015	engadget, <i>Ein Photonen-Simulator für euren Browser</i>

COMPUTER SKILLS

Proficient in	C++14, C, CUDA, PYTHON, MATLAB, JAVASCRIPT
Operating Systems	LINUX, MACOS, WINDOWS

MOVIE CREDITS

OCT 2014	Big Hero 6 WALT DISNEY ANIMATION STUDIOS
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LANGUAGES

ENGLISH:	Fluent
GERMAN:	Mothertongue